

EXHIBIT 3

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**General Causation Expert Report of
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TCE, PCE, benzene and bladder cancer

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A. Aggregate exposure to TCE, PCE and benzene

On April 18, 2024, Michal Freedhoff, the EPA Assistant Administrator for the Office of Chemical Safety and Pollution Prevention, signed the following document: *Action: Final Rule Title: Procedures for Chemical Risk Evaluation Under the Toxic Substances Control Act (TSCA)*. https://www.epa.gov/system/files/documents/2024-04/prepubcopy_frl-8529-02-ocspp_fr_doc_aa_esignature_verified.pdf In this document the EPA noted that the inclusion of all exposure pathways relevant to the chemical substance was needed for an accurate risk assessment. The EPA also proposed additional regulatory text to ensure that EPA would no longer exclude from the scope of TSCA risk evaluations exposure pathways that are addressed or could in the future be addressed by other EPA-administered statutes and regulatory programs (e.g. Clean Water Act). This document underscores the EPA belief that accurate TSCA risk evaluations should consider all possible routes of exposure in evaluating a hazard. TSCA is designed to evaluate risk to people from occupational and consumer exposures. However, the principle also holds true for human environmental exposure such as Camp Lejeune.

At Camp Lejeune risk evaluations have focused on TCE exposure from ingesting contaminated drinking water. However, when estimating risk from TCE it is important to also consider inhalation and dermal exposure resulting from the use of the TCE-containing drinking water for cleaning and bathing. Results from PBPK modeling and from human experimental samples have shown that inhalation and dermal exposure from TCE-contaminated water is at least equal to that from ingestion.^{129, 130} A 2024 study by Rosenfeld et al. used new methodology to quantify cancer risk for the Marines who had lived at Camp Lejeune between 1953 and 1986.¹²⁶ They estimated that most of the increased cancer risk (59%) was in fact due to inhalation from the contaminated drinking water. This suggests that, at the very least, one should double the ingestion exposure of TCE to estimate total TCE exposure at Camp Lejeune. Similarly, Health Canada has determined that for PCE the contribution of the dermal route is equivalent to that of the oral ingestion. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water/canadian-drinking-water-guidelines.html>

Breathing indoor air contaminants in Camp Lejeune's buildings due to vapor intrusion is another potential pathway of exposure to shallow groundwater contaminants. Volatile chemicals such as TCE and PCE in contaminated shallow groundwater can evaporate and move upward through the ground surface into indoor air of overlying or nearby buildings—this process is called vapor intrusion. At this time ATSDR is evaluating about 150 buildings at Camp Lejeune. <https://www.atsdr.cdc.gov/sites/lejeune/Vapor-Intrusion-PHA.html> Although the values obtained will reflect current rather than historical levels of contaminants in the groundwater, they may at least provide some insight into the contribution of this exposure pathway to total exposure.

A. Cumulative co-exposure to TCE and PCE and benzene

Cumulative exposures are of particular interest when conducting community-based assessments that need to take into account exposure to multiple chemical stressors such as the